

Peer Review

Review of: "Human Exposure to Arsenic and Toxic Metals Through Meat Consumption in Africa: A Review of Scientific Literature"

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This manuscript offers a highly valuable and timely review of toxic trace element contamination in meat products across African countries, based on studies published between 2000 and 2024. One of its major strengths is the extensive scope and detail presented, covering multiple toxic elements (As, Cd, Hg, Pb, Cr, Ni) and integrating human health risk data wherever possible. The work effectively contextualizes growing meat consumption trends in Africa, public health implications, and environmental exposure sources, offering a rich multidisciplinary perspective. The inclusion of sociocultural and economic drivers of meat consumption enhances the relevance and depth of the introduction.

A clear strength of the review lies in its comprehensive synthesis of available literature, especially in regions like Nigeria, Egypt, and Uganda, where data density allows for meaningful trend identification. The authors make good use of reported estimated daily or weekly intakes (EDI/EWI) and hazard quotients (HQ/HI), enhancing the public health relevance of the analysis. The attention given to tissue-specific metal accumulation (notably higher in organs than in muscle) provides practical implications for both consumers and regulatory agencies.

The search methodology is appropriately defined and well-reasoned, with a robust inclusion/exclusion criterion. Using two major databases (PubMed and Scopus) ensures scientific quality and peer-reviewed content, and the clear timeframe (2000–2024) captures both historical and recent data. The authors are transparent about their search terms and criteria, which allows for reproducibility and critical appraisal. Furthermore, they avoid overstating conclusions and carefully distinguish between areas with abundant versus limited data.

Despite these merits, there are some opportunities for improvement that could enhance the clarity and analytical depth of the review. First, while the manuscript is information-rich, the narrative could benefit from a clearer structure in sections summarizing study results by country. Currently, the transitions between studies are often abrupt, and long paragraphs with dense numeric data may overwhelm readers. Summarizing these findings more concisely in tabular or graphical formats (e.g., heatmaps or element-wise comparative tables by country) could enhance accessibility.

Second, while the review mentions that analytical techniques were not a focus, brief commentary on the variation in analytical methods (e.g., AAS vs. ICP-MS) and units (wet vs. dry weight) would still be useful. This would help readers understand the potential limitations when comparing studies and ensure a more nuanced interpretation of concentration values and risk assessments. Even a short paragraph acknowledging how methodological heterogeneity may impact interpretation would add rigor.

Third, although the review stresses the relatively lower contribution of meat (compared to fish or crops) to total toxic element exposure, a more quantitative or visual comparison—where data allow—could strengthen this conclusion. For instance, a figure illustrating comparative contributions of meat versus other food groups to total dietary Cd or Pb exposure in selected African contexts would improve clarity and impact. Are there national dietary surveys or FAO/WHO reports that could complement these comparisons?

Fourth, the geographical imbalance of studies—predominantly from Nigeria—is acknowledged but could be more critically explored. The review could expand briefly on *why* such a bias might exist—whether due to stronger research infrastructure, publication practices, or local environmental health concerns. Moreover, the authors could encourage capacity building and research funding in underrepresented African regions where meat consumption is increasing but monitoring remains absent.

Fifth, the manuscript could benefit from a more developed discussion on regulatory gaps and public health responses. While some mention is made of maximum residue limits and international safety benchmarks (e.g., TDI, BMDL), the review would be strengthened by listing which African countries currently have active food safety monitoring systems for toxic metals in meat. Are there regional efforts (e.g., via the African Union or ECOWAS) aimed at harmonizing standards or strengthening surveillance?

Sixth, in the concluding discussion, the authors rightly emphasize the importance of continued monitoring and risk communication. However, they could go a step further by outlining actionable recommendations. For example, encouraging targeted sampling in areas near known pollution sources, promoting consumer guidance to limit intake of organ meats from such areas, or integrating toxic

element screening into veterinary inspection protocols. These recommendations would bridge the gap between scientific evidence and practical health policy.

Seventh, a short reflection on equity issues could add a thoughtful dimension to the review. In some regions, organ meats are consumed more commonly by lower-income populations due to affordability, potentially increasing exposure to contaminants. The authors could briefly discuss how risk mitigation strategies must consider cultural preferences and economic constraints to avoid unintended nutritional or social consequences.

Eighth, while statements on funding and conflicts of interest are appropriately included, a brief section on study limitations would be useful. For instance, the review is limited to English-language publications indexed in two databases—excluding gray literature, government reports, or local journal publications not indexed in PubMed or Scopus. Acknowledging this could help readers understand the scope and boundaries of the evidence base.

In summary, this manuscript makes a substantial and well-organized contribution to the field of environmental health and food safety in Africa. It fills a critical knowledge gap by consolidating evidence of toxic trace element exposure through meat, offering scientific grounding for policy development, public awareness, and further research. Refining the structure, incorporating cross-food group comparisons, and expanding policy discussion would elevate its impact and accessibility for a broader audience, including researchers, health officials, and international agencies.

Declarations

Potential competing interests: No potential competing interests to declare.